



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,702	06/27/2003	Thomas S. Ellis	DP-309231	9673
22851	7590	05/18/2006	EXAMINER	
DELPHI TECHNOLOGIES, INC.			NGUYEN, DILINH P	
M/C 480-410-202			ART UNIT	
PO BOX 5052			PAPER NUMBER	
TROY, MI 48007			2814	

DATE MAILED: 05/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/608,702

Applicant(s)

ELLIS ET AL.

Examiner

DiLinh Nguyen

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2,4-14 and 16-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,4-14 and 16-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Objections*

Claims 4, 6, 8, 10, 12, 16-18 and 20 are objected to because of the following informalities:

Line 5, claim 4 and line 1, claims 8, 10, replace "the matrix" with --the synthetic resin matrix--.

Line 5, claim 4, replace "the particles" with --the inorganic filler particles--.

Line 6, claim 4 and line 1, claim 5 replace "the inorganic filler" with --the inorganic filler particles--.

Line 1, claim 6, replace "the filler" with --the inorganic filler particles--.

Line 1, claim 12, replace "the composite" with --the polymeric composite--.

Line 1, claims 16-17, replace "the inorganic filler" with --the inorganic particulate filler--.

Line 1, claim 18, replace "the filler" with --the inorganic particulate filler--.

Line 1, claim 20, replace "the resin" with --the thermoplastic resin matrix--.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2814

2. Claims 2 and 4-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503).

- Regarding claim 4, Kaminaga et al. disclose an encapsulated, overmolded and/or underfilled electrical component, comprising:

an electrical component encapsulated 1, overmolded and/or underfilled with a polymeric composite including a synthetic resin matrix 7 and inorganic filler particles substantially uniformly distributed in the matrix (fig. 1a, column 6, lines 10-15).

Kaminaga et al. do not explicitly disclose the particles having a platelet structure and the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite.

However, Matayabas, JR. et al. disclose a semiconductor device comprising particles having a platelet structure defined by opposite substantially flat and substantially parallel faces (para 0018, para 0024, claim 6), the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite (claim 30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the particles of Kaminaga et al. by having particles having platelet structure such as clay because as taught by Matayabas, JR. et al., for the purposes of aiding exfoliation in the composite and improving the strength of the polymer/clay interface and reducing diffusion of gasses and low molecular weight components through the material (para 0044 and para 0045).

Art Unit: 2814

- Regarding claim 2, Kaminaga et al. disclose wherein the electrical component is a substrate 1 having an electrical circuit formed on at least one surface of the substrate and at least one semiconductor chip 3 electrically connected to the electrical circuit (fig. 1A).
- Regarding claim 5, Matayabas, JR. et al. disclose that the inorganic filler content is 0.5 weight percent to 25 weight percent based on the weight of the polymeric composite (claim 30).
- Regarding claims 6-7, Matayabas, JR. et al. disclose that wherein the filler is a smectite clay mineral and wherein the smectite clay mineral is montmorillonite (claim 13).
- Regarding claims 8-9, Kaminaga et al. disclose the matrix is an epoxy resin (column 3, lines 67 and column 6, line 10).
- Regarding claim 10, Matayabas, JR. et al. disclose that wherein the matrix is a thermoplastic resin (para 0024).

3. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503) as applied to claim 4 above, and further in view of Capote et al. (U.S. Pat. 6335571).

As discussed in details above, the combination of Kaminaga et al. in view of Matayabas, JR. et al. substantially disclose all the limitations as claimed above except for the composite has a CTE from about 5 to 20 ppm/°C.

However, Capote et al. disclose a semiconductor device comprising a composite has a CTE from about 5 to 20 ppm/°C (cover fig., column 8, lines 15-20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of the above combination to minimize the stress on the solder joint for the composite, as shown by Capote et al. (column 8, lines 17-19).

4. Claims 4 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chuang et al. (U.S. Pub. 2004/0084758) in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503).

Chuang et al. disclose an encapsulated, overmolded and/or underfilled electrical component, comprising:

an electrical component 31 or 36 encapsulated and overmolded with a polymeric composite including a thermoplastic resin matrix 39, wherein the thermoplastic resin is selected from polycarbonates and polyester (cover fig., para 0027).

Chuang et al. do not explicitly disclose the matrix comprising inorganic filler particles having a platelet structure and the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite.

However, Matayabas, JR. et al. disclose a semiconductor device comprising inorganic filler particles having a platelet structure defined by opposite substantially flat and substantially parallel faces (para 0018, para 0024, claim 6), the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite (claim 30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device structure of Chuang et al. by having inorganic filler particles having platelet

structure such as clay because as taught by Matayabas, JR. et al., for the purposes of aiding exfoliation in the composite and improving the strength of the polymer/clay interface and reducing diffusion of gasses and low molecular weight components through the material (para 0044 and para 0045).

5. Claims 13-14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Murakami et al. (U.S. Pat. 6081023).

- Regarding claim 13, Kaminaga et al. disclose an encapsulated, overmolded and/or underfilled electrical component, comprising:

an electrical component encapsulated 1, overmolded and/or underfilled with an epoxy package matrix 7 and an inorganic particulate filler (fig. 1a, column 6, lines 10-15).

Kaminaga et al. do not explicitly disclose the epoxy package 7 is a thermoplastic resin matrix.

Murakami et al. disclose a semiconductor device comprising a thermoplastic resin composition including an inorganic particulate filler (column 20, lines 60-63). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the thermoplastic resin composition as known material as taught by Murakami et al. into the device structure of Kaminaga et al. for forming a polymeric composite, such the thermoplastic resin would provide the encapsulated of good affinity so that the electrical component can be less peeled at it interfaces.

- Regarding claim 14, Kaminaga et al. disclose wherein the electrical component is a substrate 1 having an electrical circuit formed on at least one surface of the substrate and at least one semiconductor chip 3 electrically connected to the electrical circuit (fig. 1A).
- Regarding claim 20, Murakami et al. disclose that the resin is selected from the group consisting of polyester and polyamide (column 20, column 60-62).

6. Claims 13 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chuang et al. (U.S. Pub. 2004/0084758) in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503).

- Regarding claims 13 and 16-19, Chuang et al. disclose an encapsulated, overmolded electrical component, comprising:  
an electrical component 31 or 36 encapsulated and overmolded with a polymeric composite including a thermoplastic rein matrix 39 (cover fig., column 0027).

Chuang et al. do not explicitly disclose an inorganic particulate filler, wherein the filler is montmorillonite and the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite.

However, Matayabas, JR. et al. disclose a semiconductor device comprising a thermoplastic matrix (para 0024) having an inorganic particulate filler is a montmorillonite (claim 13) and wherein the inorganic filler content is 0.5 weight percent to 25 weight percent (claim 30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device structure of Chuang et al. by having an inorganic particulate filler such as montmorillonite because as taught by Matayabas, JR. et al.,



Art Unit: 2814

for the purposes of aiding exfoliation in the composite and improving the strength of the polymer/clay interface and reducing diffusion of gasses and low molecular weight components through the material (para 0044 and para 0045).

- Regarding claim 20, Chuang et al. discloses that the resin is selected from the group consisting of polycarbonate and polyester (para 0027).

7. Claims 13-14 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503).

- Regarding claims 13 and 16-19, Kaminaga et al. disclose an encapsulated, overmolded and/or undeffilled electrical component, comprising:  
  
an electrical component encapsulated 1, overmolded and/or underfilled with an epoxy package matrix 7 and an inorganic particulate filler (fig. 1a, column 6, lines 10-15).

Kaminaga et al. do not explicitly disclose the epoxy package 7 is a thermoplastic resin matrix.

However, Matayabas, JR. et al. disclose a semiconductor device comprising a thermoplastic matrix (para 0024) having an inorganic particulate filler is a montmorillonite (claim 13) and wherein the inorganic filler content is 0.5 weight percent to 25 weight percent (claim 30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device structure of Chuang et al. by having an inorganic particulate filler such as montmorillonite because as taught by Matayabas, JR. et al., for the purposes of aiding exfoliation in the composite and improving the strength of the

Art Unit: 2814

polymer/clay interface and reducing diffusion of gasses and low molecular weight components through the material (para 0044 and para 0045).

- Regarding claim 14, Kaminaga et al. disclose wherein the electrical component is a substrate 1 having an electrical circuit formed on at least one surface of the substrate and at least one semiconductor chip 3 electrically connected to the electrical circuit (fig. 1A).

8. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) or Chuang et al. (U.S. Pub. 2004/0084758) in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503) or Murakami et al. (U.S. Pat. 6081023) as applied to claim 13 above, and further in view of Yu et al. (U.S. Pat. 5153657).

As discussed in details above, the combination of Kaminaga et al. in view of Matayabas, JR. et al. substantially disclose all the limitations as claimed above except for the inorganic filler is glass spheres.

Yu et al. disclose an inorganic filler is glass spheres (column 13, lines 45) and wherein an average diameter of from about 1 micrometer to about 3 micrometers (column 14, lines 36-37). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select glass spheres as known material, as taught by Yu et al. into the device structure of the above combination for forming the inorganic fillers as being claimed since the glass spheres would maintain good conformance in the lateral direction (column 12, lines 31-32). Moreover, selection of a known material based on its suitability for its intended

Art Unit: 2814

use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

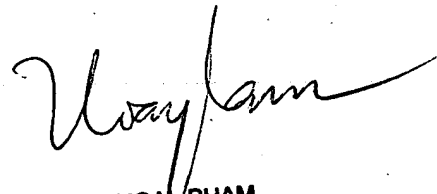
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN

  
HOA PHAM  
PRIMARY EXAMINER